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2. That I am well acquainted with the French and English languages.

3. That the attached is, to the best of my knowledge and belief, a true translation into the English language of the accompanying copy of the specification filed with the application for a patent in France on March 21, 2002 under the number 02/03,893 and the official certificate attached thereto.

4. That I believe that all statements made herein of my own knowledge are true and that all statements made on information and belief are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the patent application in the United States of America or any patent issuing thereon.

For and on behalf of RWS Group Ltd

The 17th day of August 2007

FRENCH REPUBLIC

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REQUEST FOR GRANT 1/2

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DATE 21 MARCH 2002
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NATIONAL REGISTRATION No. ASSIGNED BY THE INPI 02/03,893
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(optional) 408 FR

1 NAME AND ADDRESS OF THE APPLICANT OR THE REPRESENTATIVE TO WHOM THE CORRESPONDENCE IS TO BE ADDRESSED

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Confirmation of filing by fax ☒ No. assigned by the INPI to the fax

2 NATURE OF THE APPLICATION	Tick one of the 4 following boxes
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3 TITLE OF THE INVENTION (200 characters or spaces maximum)

AGRICULTURAL MOWER COMPRISING A CARRYING VEHICLE AND A NUMBER OF WORK UNITS

4 PRIORITY DECLARATION OR APPLICATION FOR THE BENEFIT OF THE FILING DATE OF A PRIOR FRENCH APPLICATION

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5 APPLICANT ☐ **If there are other applicants, tick the box and use the "continuation" form**

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7 INVENTOR (S)	
The inventors are the applicants	☐ Yes ☒ No **In this case, provide a separate designation of the inventor(s)**
8 SEARCH REPORT	**For a patent application only (including division and conversion)**
Immediate compilation	☒
Deferred compilation	☐
Fee paid in instalments	**Payment in two instalments, for natural persons only** ☐ Yes ☐ No
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10 SIGNATURE OF THE APPLICANT OR REPRESENTATIVE (name and capacity of the signatory) BONNIN DAVID REPRESENTATIVE [signature]	**SIGNED FOR THE PREFECTURE OR THE INPI** A. ALLEGRE [signature]

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Description

The present invention relates to an agricultural machine comprising a carrying vehicle and a number of work units which are intended to cut a standing product, said work units being connected to said carrying vehicle.

In the prior art there is a self-propelled mower comprising a carrying vehicle and three work units. Said carrying vehicle is intended to support and to drive said work units. To do this, said carrying vehicle comprises, in particular, a chassis, an engine and a driver's cab. Said work units are, for their part, intended to cut a standing product such as grass, for example. This known self-propelled mower more specifically comprises a front work unit and two lateral work units. Viewed in a direction of forward travel, the front work unit is arranged at the front of said carrying vehicle. The lateral work units are arranged behind the front work unit, on either side of the area worked by the latter. Thus, this known self-propelled mower has a working width which may reach 9 meters. In the transport position, the front work unit is moved away from the ground by a substantially vertical translational movement. Said lateral work units are, for their part, brought close to a vertical mid-plane of said carrying vehicle by a pivoting movement. As a result, this known self-propelled mower can pass from a width of about 9 meters for work to a width of about 3 meters for transport. Such a reduction in width is necessary to allow the mower to travel on the public highway.

It is an object of the present invention to obtain an agricultural machine which makes possible an increased working width while at the same time complying, when in the transport position, with the legislation governing

travel on the public highway.

To this end, the agricultural machine according to the present invention is characterized in that it comprises:

- at least two front work units arranged, during work and viewed in a direction of forward travel, at the front of said carrying vehicle, and
- at least two lateral work units arranged, during work, on either side of a work area of said front work units,

said front work units and said lateral work units being able to be moved with respect to said carrying vehicle in order to occupy a transport position or a work position.

Other features of the invention, to be considered separately or in all their possible combinations, will become apparent in the following description of several nonlimiting exemplary embodiments of the invention which are represented in the appended drawings, in which:

- **figure 1** represents, in plan view and in the work position, a first exemplary embodiment of an agricultural machine according to the present invention,
- **figure 2** represents, likewise in plan view, the first exemplary embodiment of figure 1 in the transport position,
- **figure 3** represents, viewed from behind and on a different scale, the first exemplary embodiment of figure 1 in the transport position,
- **figure 4** represents, in plan view, the first exemplary embodiment of figure 1 in a first work configuration,
- **figure 5** represents, in plan view, the first exemplary embodiment of figure 1 in a second work configuration,

- **figure 6** represents, in plan view and in the work position, a second exemplary embodiment of an agricultural machine according to the present invention,
- **figure 7** represents, in plan view, the second exemplary embodiment of figure 6 in the transport position,
- **figure 8** represents, in plan view, the second exemplary embodiment of figure 6 in a work configuration,
- **figure 9** represents a partial view of a third exemplary embodiment of an agricultural machine according to the present invention in the work position,
- **figure 10** represents, in plan view, a fourth exemplary embodiment according to the present invention in a first work configuration,
- **figure 11** represents, in plan view, the fourth exemplary embodiment of figure 10 in a second work configuration,
- **figure 12** represents a partial view, from behind and on a different scale, of the fourth exemplary embodiment in the first work configuration,
- **figure 13** represents a partial view, from behind and on a different scale, of the fourth exemplary embodiment in the second work configuration.

Figure 1 represents, in plan view, an agricultural machine (1) moving in a direction of forward travel indicated by the arrow (2). In the remainder of the description, the following ideas of "front" and "rear", "in front of" and "behind" are defined with respect to the direction of forward travel (2) and the ideas of "right" and "left" are defined when viewing said agricultural machine (1) from the rear in the direction of forward travel (2).

Said agricultural machine (1) comprises a carrying vehicle (3) and work units (4, 5). Said work units (4, 5) are intended to cut a standing product such as grass, for example. For its part, said carrying vehicle (3) is intended to drive and to at least partially support said work units (4, 5).

Thus, in a manner known to a person skilled in the art, said carrying vehicle (3) comprises a chassis which rests on the ground by means of four wheels (15a, 15b). Said four wheels (15a, 15b) are advantageously steered wheels in order to give said agricultural machine (1) a remarkable degree of maneuverability. An engine and a transmission allowing said carrying vehicle (3) to be autonomous are also provided. Preferably, said transmission makes said four wheels (15a, 15b) driven wheels. Likewise preferably, said engine is additionally capable of driving said work units (4, 5). The transmission of power from said engine to said work units (4, 5) takes place by means of mechanical and/or hydraulic transmission elements known to a person skilled in the art. Said carrying vehicle (3) comprises a driver's cab (6) which allows a driver to take control of the whole of said agricultural machine (1).

Each work unit (4, 5) comprises, for its part, a cutting device resting at least partially on the ground during work. In a manner known to a person skilled in the art, said cutting device is composed of a multitude of cutting members which are driven in rotation about a respective upwardly directed axis. The path described by said cutting members during rotation has been represented by circles in the form of dashed lines (16). Such a cutting device is known to a person skilled in the art and will therefore not be described further.

According to the present invention, said agricultural

machine (1) advantageously comprises:

- at least two front work units (4a, 4b) arranged, during work and viewed in said direction of forward travel (2), at the front of said carrying vehicle (3), and
- at least two lateral work units (5a, 5b) arranged, during work, on either side of a work area (18) of said front work units (4a, 4b).

Furthermore, said front work units (4a, 4b) and said lateral work units (5a, 5b) are advantageously able to be moved with respect to said carrying vehicle (3) so as to occupy a transport position or a work position.

In the first exemplary embodiment represented in figures 1 to 5, said agricultural machine (1) comprises two front work units (4a, 4b) and two lateral work units (5a, 5b).

In the work position as represented in figures 1, 4 and 5, said front work units (4a, 4b) are arranged transversely to said direction of forward travel (2) and preferably in the continuation of one another. Advantageously, said front work units (4a, 4b) are arranged so that their respective work areas (17a, 17b) slightly overlap one another. Consequently, the standing product will be cut perfectly over the entirety of the work area (18) covered by said front work units (4a, 4b). In the work position, said front work units (4a, 4b) are preferably arranged symmetrically with respect to a vertical mid-plane of said carrying vehicle (3). In the light of figure 1, and likewise advantageously, the width of said work area (18) is greater than the width (19) of said carrying vehicle (3) on the ground. Thus, during work, said carrying vehicle (3) does not crush the standing product.

In the work position as represented in figures 1, 4 and 5, said lateral work units (5a, 5b) are likewise arranged transversely to said direction of forward travel (2) and advantageously in the continuation of one another. Preferably, said lateral work units (5a, 5b) are additionally arranged so that their respective work areas (20a, 20b) slightly overlap said work area (18). In the work position and viewed in said direction of forward travel (2), said lateral work units (5a, 5b) are preferably arranged at the rear of said front work units (4a, 4b). Consequently, in the first exemplary embodiment represented in figures 1 to 5, said lateral work units (5a, 5b) are arranged at the rear of said carrying vehicle (3). Good distribution of the masses of said agricultural machine (1) on the various wheels (15a, 15b) of said carrying vehicle (3) is thus obtained.

In the work position and in light of figure 1, said work units (4a, 4b, 5a, 5b) arranged in this way allow said agricultural machine (1) to have a relatively wide total work area (21). By way of nonlimiting example, with work units (4a, 4b, 5a, 5b) each having a working width of 3 meters, and taking into account the overlapping of said respective work areas (17a, 17b, 20a, 20b), said agricultural machine (1) has a total working width of close to 11.5 meters.

In the transport position and in the light of figures 2 and 3, said work units (4a, 4b, 5a, 5b) are moved in such a way that said agricultural machine (1) complies with the legislation governing travel on the public highway. Currently in France, this legislation particularly restricts the width (23) of said agricultural machine (1) to 3 meters and the height (24) of said agricultural machine (1) to 4 meters.

To this end, in the first exemplary embodiment represented in figures 1 to 5, each front work unit (4a, 4b) is connected in a pivoting manner to said carrying vehicle (3) by means of a respective articulation (7a, 7b) whose axis is directed in said direction of forward travel (2). Also provided are operating members, for example cylinder actuators, intended to pivot said front work units (4a, 4b) about said respective articulation (7a, 7b) from a substantially horizontal work position to a substantially vertical transport position, and vice versa. In the transport position, said front work units (4a, 4b) are preferably arranged symmetrically with respect to said vertical mid-plane of said carrying vehicle (3). In the light of figure 2, said respective articulations (7a, 7b) are positioned so that, in the transport position, said front work units (4a, 4b) do not exceed the permitted width (23) for traveling on the public highway. It may be noted that said carrying vehicle (3) itself complies with said permitted width (23).

Said front work units (4a, 4b) are preferably connected by means of said respective articulations (7a, 7b) to a hitching structure (8), which hitching structure (8) is in turn connected to a front hitching device (9) of said carrying vehicle (3). Said front hitching device (9), represented by way of nonlimiting example in the form of a "3-point" hitching device, advantageously makes it possible to move said hitching structure (8), and consequently said front work units (4a, 4b), in a substantially vertical direction. Thus, when passing from the horizontal work position to the substantially vertical transport position, said hitching device (9) makes it possible, if necessary, to facilitate the maneuver by moving said front work units (4a, 4b) away from the ground. Once said substantially vertical transport position has been reached, said hitching

device (9) makes it possible, if necessary, to somewhat reduce the height (24) of said agricultural machine (1) by lowering said hitching structure (8).

In the first exemplary embodiment represented in figures 1 to 5, each lateral work unit (5a, 5b) is connected in a pivoting manner to said carrying vehicle (3) by means of a respective articulation (10a, 10b) whose axis is directed in said direction of forward travel (2). Also provided are operating members intended to pivot said lateral work units (5a, 5b) from a horizontal work position to a substantially vertical transport position, and vice versa. In the transport position, said lateral work units (5a, 5b) are preferably arranged symmetrically with respect to said vertical mid-plane of said carrying vehicle (3). In the light of figure 3, said respective articulations (10a, 10b) are positioned so that, in the transport position, said lateral work units (5a, 5b) do not exceed the permitted width (23) for traveling on the public highway.

In the first exemplary embodiment, and particularly advantageously, each lateral work unit (5a, 5b) is additionally connected in a sliding manner to said carrying vehicle (3) by means of a respective articulation (11a, 11b) whose axis is directed transversely to said direction of forward travel (2). Also provided are operating members intended to translationally move said lateral work units (5a, 5b) in accordance with said respective articulations (11a, 11b). Each lateral work unit (5a, 5b) can thus be brought close to or moved away from said carrying vehicle (3). During work, the transverse movement of said lateral work units (5a, 5b) advantageously makes it possible to modify the overlapping between said work area (18) of said front work units (4a, 4b) and the respective work areas (20a, 20b) of said lateral work

units (5a, 5b). Such a modification of the overlapping may be advantageous when said agricultural machine (1) is working at an inclination or when it is working along a curve. Preferably, the translational movement of each lateral work unit (5a, 5b) in accordance with said respective articulation (11a, 11b) may be controlled individually during the work. When passing into the transport position, the translational movement of said lateral work units (5a, 5b) toward said carrying vehicle (3) makes it possible in particular to facilitate pivoting of these units about said articulations (10a, 10b). In the light of figure 3, when said lateral work units (5a, 5b) are in the substantially vertical transport position, said translational movement in accordance with said respective articulations (11a, 11b) also makes it possible to reduce the height (24) of said agricultural machine (1).

In the first exemplary embodiment represented in figures 1 to 5, each lateral work unit (5a, 5b) is thus connected in a sliding manner to a respective carrying arm (12a, 12b) by means of said respective articulation (11a, 11b). In turn, each carrying arm (12a, 12b) is connected in a pivoting manner to said carrying vehicle (3) by means of said respective articulation (10a, 10b).

Said carrying arms (12a, 12b) are preferably connected by means of said respective articulations (10a, 10b) to a hitching structure (13), which hitching structure (13) is connected for its part to a rear hitching device (14) of said carrying vehicle (3). Said rear hitching device (14), represented by way of nonlimiting example in the form of a "3-point" hitching device, advantageously makes it possible to move said hitching structure (13), and consequently said lateral work units (5a, 5b), in a substantially vertical direction.

Thus, when passing from the horizontal work position to the substantially vertical transport position, said rear hitching device (14) makes it possible, if necessary to facilitate the maneuver by moving said lateral work units (5a, 5b) away from the ground.

Said work units (4a, 4b, 5a, 5b) advantageously comprise a respective suspension device (22). During work, each suspension device (22) makes it possible on the one hand to transfer at least part of the weight of the corresponding cutting device to said carrying vehicle (3). On the other hand, each suspension device (22) allows said cutting device a certain freedom of movement with respect to said carrying vehicle (3). Each cutting device may thus move individually in a substantially vertical direction and about a mid-axis of said work unit (4a, 4b, 5a, 5b) directed in said direction of forward travel (2). This freedom of movement advantageously makes it possible for said cutting devices to follow the irregularities of the ground independently of said carrying vehicle (3). When said work units (4a, 4b, 5a, 5b) are in the work position, each suspension device (22) additionally makes it possible to advantageously move each cutting device individually away from the ground in order, for example, to carry out maneuvers at the end of fields or to avoid an obstacle. Such suspension devices (22) are known to a person skilled in the art and will therefore not be described further.

Preferably, said driver's cab (6) comprises a control device connected in particular to the operating members for said articulations (7a, 7b, 10a, 10b, 11a, 11b). Said control device is intended to autonomously manage the movement of said work units (4a, 4b, 5a, 5b) upon passing from the work position to the transport position, and vice versa. The driver of said

agricultural machine (1) thus advantageously sees his task simplified.

Preferably, each work unit (4, 5) also comprises a processing device intended to accelerate drying of the cut product by the corresponding cutting device. In a manner known to a person skilled in the art, each processing device consists, for example, of a rotor or of two counter-rotating rollers.

Particularly advantageously, each work unit (4a, 4b, 5a, 5b) additionally comprises a respective conveying device (25a, 25b, 26a, 26b) intended to move the product cut by the corresponding cutting device before said cut product touches the ground.

In a first work configuration as represented in figure 4, the product cut over said total work area (21) is grouped into two windrows (27a, 27b).

In a second work configuration as represented in figure 5, the product cut over said total work area (21) is grouped into a single windrow (28).

Particularly advantageously, the driver of said agricultural machine (1) may pass from said first work configuration to said second work configuration, and vice versa, from his driver's cab (6).

To this end, in the first exemplary embodiment represented in figures 1 to 5, said conveying devices (25a, 25b) with which said front work units (4a, 4b) are respectively equipped each comprise a conveyor belt (29a, 29b) arranged transversely behind said corresponding cutting devices. Each conveying device (25a, 25b) is advantageously connected in a sliding manner to said corresponding front work unit (4a, 4b). In the work position, said conveying devices (25a, 25b)

can thus be translationally moved horizontally and transversely to said direction of forward travel (2). Operating members are provided for this purpose. In a manner known to a person skilled in the art, each conveyor belt (29a, 29b) comprises a belt wound around two cylinders. At least one of said cylinders is driven in rotation by means of a motor. The direction of travel of said conveyor belts (29a, 29b) can advantageously be reversed. Said direction of travel of said conveyor belts (29a, 29b) has been represented by means of arrows in figures 4 and 5.

Said conveying devices (26a, 26b) with which said lateral work units (5a, 5b) are respectively equipped each comprise two conveyor belts (30a, 31a; 30b, 31b) arranged one above the other. Said conveyor belts (30a, 31a, 30b, 31b) are arranged transversely behind the corresponding cutting device. In a manner known to a person skilled in the art, each conveyor belt (30a, 31a, 30b, 31b) comprises a belt wound around two respective cylinders. At least one of said cylinders of each conveyor belt (30a, 31a, 30b, 31b) is driven in rotation by means of a motor. Particularly advantageously, the lower conveyor belts (31a, 31b) are advantageously connected in a sliding manner to said corresponding lateral work unit (5a, 5b). In the work position, said lower conveyor belts (31a, 31b) can thus be translationally moved horizontally and transversely to said direction of forward travel (2). Operating members are provided for this purpose. By contrast, said upper conveyor belts (30a, 30b) and their respective cylinders retain a fixed position with respect to said corresponding lateral work unit (5a, 5b). Said direction of travel of said conveyor belts (30a, 31a; 30b, 31b) has been represented by means of arrows in figures 4 and 5.

In the first work configuration, said front conveying devices (25a, 25b) are brought close to the vertical mid-plane of said carrying vehicle (3). The direction of travel of said conveyor belts (29a, 29b) is as represented in figure 4. Said front conveying devices (25a, 25b) are dimensioned and moved translationally in such a manner that the product cut by each front work unit (4a, 4b) is deposited beside said carrying vehicle (3) without thereby going outside said respective work area (17a, 17b). Said front work units (4a, 4b) thus form a respective half-windrow (32a, 32b) on either side of said carrying vehicle (3). In the light of figure 4, said lower conveyor belts (31a, 31b) of said lateral conveying devices (26a, 26b) remain positioned under said respective upper conveyor belts (30a, 30b). Thus, said lower conveyor belts (31a, 31b) are not in contact with the cut product. Preferably, said lower conveyor belts (31a, 31b) are not driven in this work configuration. By contrast, the direction of travel of said upper conveyor belts (30a, 30b) is as represented in figure 4. Said upper conveyor belts (30a, 30b) are dimensioned in such a way that the product cut by said corresponding lateral work unit (5a, 5b) is deposited immediately beside said existing half-windrow (32a, 32b). The product cut by said front work unit (4a) and by said lateral work unit (5a) thus forms said windrow (27a). Likewise, the product cut by said front work unit (4b) and by said lateral work unit (5b) thus forms said windrow (27b).

In the second work configuration represented in figure 5, said front conveying devices (25a, 25b) are moved away from the vertical mid-plane of said carrying vehicle (3). The direction of travel of said conveyor belts (29a, 29b) is as represented in figure 5. The product cut by each front work unit (4a, 4b) is thus deposited in front of said carrying vehicle (3) in order to form a single half-windrow (33). Preferably,

said front conveying devices (25a, 25b) are moved translationally in such a way that said front wheels (15a) and the two rear wheels (15b) of said carrying vehicle (3) can pass on either side of said half-windrow (33). In the light of figure 5, said lower conveyor belts (31a, 31b) of said lateral conveying devices (26a, 26b) are moved translationally toward the vertical mid-plane of said carrying vehicle (3). The direction of travel of said upper conveyor belts (30a, 30b) and of said lower conveyor belts (31a, 31b) is as represented in figure 5. The product cut by said lateral work unit (5a, 5b) is thus first moved by said upper conveyor belt (30a, 30b) and then by said lower conveyor belt (31a, 31b). Said lower conveyor belts (31a, 31b) are dimensioned in such a way that the product cut by said corresponding lateral work unit (5a, 5b) is deposited immediately beside said half-windrow (33). The product cut by said front work units (4a, 4b) and by said lateral work units (5a, 5b) thus forms said single windrow (28). Said windrow (28) is advantageously arranged along a longitudinal mid-axis of said agricultural machine (1).

For reasons of clarity, said articulations (7a, 7b), said hitching structure (8) and said front hitching device (9) have not been represented in figures 4 and 5. Likewise, said articulations (10a, 10b), said hitching structure (13) and said rear hitching device (14), said articulations (11a, 11b) and said arms (12a, 12b) have not been represented in figure 5.

Figures 6 to 8 represent a second exemplary embodiment of an agricultural machine (101) according to the present invention. This agricultural machine (101) comprises a certain number of elements which have been described above. These elements will consequently keep the same reference number and will not be described again. It also comprises a certain number of elements

which are comparable to elements of the agricultural machine (1) described above. These elements will be assigned the same reference number as these comparable elements of the agricultural machine (1) but increased by 100. They will only be described if it proves necessary to do so.

Thus, said agricultural machine (101) likewise comprises two front work units (4a, 4b) and two lateral work units (5a, 5b) connected to a carrying vehicle (103). Viewed in the direction of forward travel (2) during work, said front work units (4a, 4b) are arranged at the front of said carrying vehicle (103). Said lateral work units (5a, 5b) are arranged at the rear of said front work units (4a, 4b). In the work position as represented in figures 6 and 8, said lateral work units (5a, 5b) are additionally arranged on either side of the work area (18) of said front work units (4a, 4b).

By contrast, in the second exemplary embodiment represented in figures 6 to 8, said lateral work units (5a, 5b) are arranged on the sides of said carrying vehicle (103). Furthermore, viewed in said direction of forward travel (2) during work, said carrying vehicle (103) comprises a driver's cab (106) advantageously arranged at the rear of said lateral work units (5a, 5b). During work, the driver of said agricultural machine (101) thus has said front work units (4a, 4b) and said lateral work units (5a, 5b) in his field of view simultaneously.

In the second exemplary embodiment, said work units (4a, 4b, 5a, 5b) are likewise moved with respect to said carrying vehicle (103) so as to reach a transport position as represented in figure 7.

Thus, each front work unit (4a, 4b) is connected in a pivoting manner to said carrying vehicle (103). This connection has been largely described in the first exemplary embodiment represented in figures 1 to 5.

In the second exemplary embodiment represented in figures 6 to 8, each lateral work unit (5a, 5b) is connected in a pivoting manner to said carrying vehicle (103) by means of a respective articulation (110a, 110b) whose axis is directed in said direction of forward travel (2). Also provided are operating members intended to pivot said lateral work units (5a, 5b) from a horizontal work position to a substantially vertical transport position, and vice versa. In the transport position, said lateral work units (5a, 5b) are preferably likewise arranged symmetrically with respect to said vertical mid-plane of said carrying vehicle (103). In the light of figure 7, said respective articulations (110a, 110b) are positioned so that, in the transport position, said lateral work units (5a, 5b) do not exceed said permitted gage (23) for traveling on the public highway. In the transport position, said lateral work units (5a, 5b) are advantageously arranged between the front wheels (15a) and the rear wheels (15b) of said carrying vehicle (103).

Particularly advantageously, each lateral work unit (5a, 5b) is additionally connected in a sliding manner to said carrying vehicle (103) by means of a respective articulation (11a, 11b) whose axis is directed transversely to said direction of forward travel (2). Also provided are operating members intended to translationally move said lateral work units (5a, 5b) in accordance with said respective articulations (11a, 11b). Each lateral work unit (5a, 5b) may thus be brought close to or moved away from said carrying vehicle (103).

Consequently, in the second exemplary embodiment represented in figures 6 to 8, each lateral work unit (5a, 5b) is connected by means of said respective articulation (11a, 11b) to a respective carrying arm (12a, 12b). In turn, each carrying arm (12a, 12b) is connected by means of said respective articulation (110a, 110b) to said carrying vehicle (103).

In the second exemplary embodiment, and particularly advantageously, said agricultural machine (101) moves, during transport, in a direction of forward travel (34) which is oppositely directed to said direction of forward travel (102). To achieve this, said driver's cab (106) is advantageously of the "reversed driving" type. Thus, in the light of figure 7, said work units (4a, 4b, 5a, 5b) arranged vertically do not obstruct the field of view of said driver during transport.

In the second exemplary embodiment, said agricultural machine (101) can work according to a first work configuration in which the product cut over said total work area (21) is grouped into two windrows. This first work configuration of said agricultural machine (101) has not been represented because it has been largely described in the first exemplary embodiment.

Said agricultural machine (101) can also work according to a second work configuration, as represented in figure 8, in which the product cut over said total work area (21) is grouped into a single windrow (28).

In the second work configuration represented in figure 8, said front conveying devices (25a, 25b) are moved away from the vertical mid-plane of said carrying vehicle (103). The direction of travel of said conveyor belts (29a, 29b) is as represented in figure 8. The product cut by each front work unit (4a, 4b) is thus

deposited in front of said carrying vehicle (103) so as to form a half-windrow (33). Preferably, said front conveying devices (25a, 25b) are moved translationally in such a way that said front wheels (15a) and the two rear wheels (15b) of said carrying vehicle (103) can pass on either side of said half-windrow (33). In the light of figure 8, said lower conveyor belts (31a, 31b) of said lateral conveying devices (26a, 26b) are moved translationally toward the vertical mid-plane of said carrying vehicle (103). The direction of travel of said upper conveyor belts (30a, 30b) and of said lower conveyor belts (31a, 31b) is as represented in figure 8. The product cut by said lateral work unit (5a, 5b) is thus first moved by said upper conveyor belt (30a, 30b) and then by said lower conveyor belt (31a, 31b). Said lower conveyor belts (31a, 31b) are dimensioned in such a way that the product cut by said corresponding lateral work unit (5a, 5b) is deposited immediately beside said half-windrow (33). The product cut by said front work units (4a, 4b) and by said lateral work units (5a, 5b) thus forms said single windrow (28). Said windrow (28) is advantageously arranged along a longitudinal mid-axis of said agricultural machine (101).

In the second exemplary embodiment represented in figure 8, the product cut by said lateral work units (5a, 5b) is deposited at the front of said rear wheels (15b). Said single windrow (28) thus achieves its final width between said front wheels (15a) and said rear wheels (15b). Particularly advantageously, said rear wheels (15b) are connected in a sliding manner to said carrying vehicle (103) by means of a respective articulation defining an axis which is substantially horizontal and transverse to said direction of forward travel (2). Also provided are operating members intended to translationally move said rear wheels (15b) in accordance with said respective articulation. Thus,

said rear wheels (15b) may, if necessary, be moved away from said carrying vehicle (103) in order not to roll over said single windrow (28). During transport on the other hand, said rear wheels (15b) readopt their initial positions as represented in figures 6 and 7 so as not to exceed said permitted gage (23) for traveling on the public highway.

For reasons of clarity, various elements for connecting said work units (4a, 4b, 5a, 5b) to said carrying vehicle (103) have not been represented in figure 8.

The agricultural machines which have just been described are merely exemplary embodiments which do not in any case limit the scope of protection defined by the subsequent claims.

Thus, in a third exemplary embodiment represented partially and on a different scale in figure 9, said lateral work units (5a, 5b) are connected in a pivoting manner to a respective arm (212a, 212b) by means of an articulation (210a, 210b) whose axis is directed in said direction of forward travel (2). In turn, each arm (212a, 212b) is connected in a sliding manner to said carrying vehicle (3) by means of an articulation (211a, 211b) whose axis is directed transversely to said direction of forward travel (2).

According to another example (not shown), said agricultural machine comprises three front work units arranged, during work, at the front of said carrying vehicle. At least one of said front work units is connected in a pivoting manner to said carrying vehicle by means of an articulation whose axis is directed in said direction of forward travel. Furthermore, at least one of said front work units is connected in a sliding manner to said carrying vehicle by means of an articulation whose axis is directed transversely to

said direction of forward travel.

According to yet another exemplary embodiment (not shown), said respective arm is advantageously telescopic. Thus, in a manner known per se, the length of said respective arm may be increased or reduced.

Figures 10 to 13 represent a fourth exemplary embodiment of an agricultural machine (301) according to the present invention. This fourth exemplary embodiment is distinguished from the preceding exemplary embodiments described mainly at the level of the conveying devices (326a, 326b) with which said lateral work units (5a, 5b) are equipped. Specifically, each conveying device (326a, 326b) comprises an upper conveyor belt (330a, 330b) and a lower conveyor belt (331a, 331b). By contrast, said lower conveyor belts (331a, 331b) are from now on connected in a pivoting manner to said corresponding lateral work unit (5a, 5b) by means of a respective articulation (37a, 37b) of upwardly directed axis. In the work position, said lower conveyor belts (331a, 331b) may thus be pivoted in a substantially horizontal plane. Operating members are provided for this purpose. Said upper conveyor belts (330a, 330b) of the fourth exemplary embodiment are similar to said upper conveyor belts (30a, 30b) of the first exemplary embodiment and will therefore not be described further.

In the first work configuration represented in figures 10 and 12, said agricultural machine (301) groups the cut product into two windrows (27a, 27b). To this end, said lower conveyor belts (331a, 331b) remain positioned under said corresponding upper conveyor belts (330a, 330b). Thus, said lower conveyor belts (331a, 331b) are not in contact with the cut product. Preferably, said lower conveyor belts (331a, 331b) are not driven in this work configuration. By contrast, the

direction of travel of said upper conveyor belts (330a, 330b) is as represented in figure 10. The product cut by said lateral work unit (5a, 5b) is therefore deposited immediately beside said existing half-windrow (32a, 32b) so as to create a respective windrow (27a, 27b). This position of said lower conveyor belts (331a, 331b) is also used when said lateral work units (5a, 5b) are placed in the transport position.

In the second work configuration represented in figures 11 and 13, said agricultural machine (301) groups the cut product into a single windrow (28). To this end, said lower conveyor belts (331a, 331b) are pivoted about said respective articulation (37a, 37b) toward a vertical mid-plane of said carrying vehicle (303). The position of said articulations (37a, 37b) is such that said lower conveyor belts (331a, 331b) can, after pivoting, take away the cut product from said corresponding upper conveyor belts (330a, 330b). Said lower conveyor belts (331a, 331b) and said upper conveyor belts (330a, 330b) are driven in the direction of travel represented in figure 11. The product cut by said work unit (5a, 5b) is thus first moved by said upper conveyor belt (330a, 330b) and then by said lower conveyor belt (331a, 331b). Said lower conveyor belts (331a, 331b) are dimensioned in such a way that said product cut by said corresponding lateral work unit (5a, 5b) is deposited immediately beside said half-windrow (33) formed by said front work units (4a, 4b). The product cut by said front work units (4a, 4b) and by said lateral work units (5a, 5b) thus forms said single windrow (28).

In the light of figure 11, said lower conveyor belts (331a, 331b) advantageously make it possible to deposit said cut product behind said rear wheels (15b) of said carrying vehicle (303), even when said lateral work units (5a, 5b) are arranged in the work position beside

said carrying vehicle (303).

For reasons of clarity, only said lateral work units (5a, 5b) and said windrows (27a, 27b; 28) have been represented in figures 12 and 13.

Advantageously, each lower conveyor belt (331a, 331b) is composed in turn of a first conveyor belt (35a, 35b) and of a second conveyor belt (36a, 36b). Said first conveyor belt (35a, 35b) and said second conveyor belt (36a, 36b) are arranged in the continuation of one another. Furthermore, said second conveyor belt (36a, 36b) is connected in a pivoting manner to said corresponding first conveyor belt (35a, 35b) by means of a respective articulation (38a, 38b) of at least substantially horizontal axis.

In the first work configuration and in light of figures 10 and 12, said first conveyor belt (35a, 35b) is substantially horizontal and said second conveyor belt (36a, 36b) is substantially vertical. Such a position makes it possible in particular to reduce the space taken up by said conveying device (326a, 326b). Said first conveyor belt (35a, 35b) is arranged at least partially below said corresponding upper conveyor belt (330a, 330b) in such a way as not to come into contact with said cut product. The cut product is therefore conveyed solely by said upper conveyor belts (330a, 330b).

In the second work configuration and in light of figures 10 and 12, said first conveyor belt (35a, 35b) remains substantially horizontal. By contrast, said second conveyor belt (36a, 36b) is from now on pivoted about said articulation (38a, 38b) so as to be likewise substantially horizontal. Furthermore, the direction of travel of said first and second conveyor belts (35a, 35b, 36a, 36b) is as represented in figure 11. The cut

product is therefore conveyed by said upper conveyor belts (330a, 330b) and then by said first conveyor belts (35a, 35b) and finally by said second conveyor belts (36a, 36b).

In the light of figure 12 in particular the axis of said respective articulation (38a, 38b) is coincident with the axis of rotation of one of said cylinders of said corresponding second conveyor belt (36a, 36b).

CLAIMS

1. An agricultural machine comprising a carrying vehicle (3; 103) and a number of work units (4a, 4b, 5a, 5b) which are intended to cut a standing product, said work units (4a, 4b, 5a, 5b) being connected to said carrying vehicle (3; 103), characterized in that said agricultural machine (1; 101) comprises:

- at least two front work units (4a, 4b) arranged, during work and viewed in a direction of forward travel (2) of said carrying vehicle (3; 103), at the front of said carrying vehicle (3; 103), and
- at least two lateral work units (5a, 5b) arranged, during work, on either side of a work area (18) of said front work units (4a, 4b),

said front work units (4a, 4b) and said lateral work units (5a, 5b) being able to be moved with respect to said carrying vehicle (3; 103) so as to occupy a transport position or a work position.

2. The agricultural machine as claimed in claim 1, characterized in that, during work and viewed in said direction of forward travel (2), said lateral work units (5a, 5b) are arranged at the rear of said front work units (4a, 4b).

3. The agricultural machine as claimed in claim 2, characterized in that, during work and viewed in said direction of forward travel (2), said lateral work units (5a, 5b) are arranged at the rear of said carrying vehicle (3; 103).

4. The agricultural machine as claimed in claim 2, characterized in that, during work and viewed in said direction of forward travel (2), said lateral work units (5a, 5b) are arranged on the sides of said carrying vehicle (3; 103).

5. The agricultural machine as claimed in any one of claims 1 to 4, characterized in that at least one of said work units (4a, 4b, 5a, 5b) is connected in a pivoting manner to said carrying vehicle (3; 103) by means of a respective articulation (7a, 7b, 10a, 10b; 110a, 110b; 210a, 210b) whose axis is directed in said direction of forward travel (2), and in that there are provided operating members intended to pivot said at least one work unit (4a, 4b, 5a, 5b) about said respective articulation (7a, 7b, 10a, 10b; 110a, 110b; 210a, 210b) from said work position to said transport position, and vice versa.

6. The agricultural machine as claimed in claim 5, characterized in that said at least one work unit (4a, 4b, 5a, 5b) is arranged:

- in the work position, at least substantially horizontally, and
- in the transport position, at least substantially vertically.

7. The agricultural machine as claimed in claim 5 or 6, characterized in that at least one of said front work units (4a, 4b) is connected by means of said respective articulation (7a, 7b) to a hitching structure (8), which hitching structure (8) is in turn connected to said carrying vehicle (3).

8. The agricultural machine as claimed in claim 7, characterized in that said carrying vehicle (3; 103) comprises a front hitching device (9) intended to move said hitching structure (8) in a substantially vertical direction.

9. The agricultural machine as claimed any one of claims 1 to 8, characterized in that at least one of said work units (4a, 4b, 5a, 5b) is connected in a sliding manner to said carrying vehicle (3; 103) by

means of a respective articulation (11a, 11b; 211a, 211b) whose axis is directed transversely to said direction of forward travel (2), and in that there are provided operating members intended to translationally move said at least one work unit (4a, 4b, 5a, 5b) in accordance with said respective articulation (11a, 11b; 211a, 211b).

10. The agricultural machine as claimed in any one of claims 5 to 8 taken in combination with claim 9, characterized in that at least one of said lateral work units (5a, 5b) is connected in a sliding manner by means of said respective articulation (11a, 11b) to a respective carrying arm (12a, 12b), said carrying arm (12a, 12b) being in turn connected in a pivoting manner by means of said respective articulation (10a, 10b; 110a, 110b) to said carrying vehicle (3).

11. The agricultural machine as claimed in any one of claims 5 to 8 taken in combination with claim 9, characterized in that at least one of said lateral work units (5a, 5b) is connected in a pivoting manner by means of said respective articulation (210a, 210b) to a respective carrying arm (212a, 212b), said carrying arm (212a, 212b) being in turn connected in a sliding manner by means of said respective articulation (211a, 211b) to said carrying vehicle (3).

12. The agricultural machine as claimed in claim 10 or 11, characterized in that said carrying arm (12a, 12b; 212a, 212b) is connected by means of said respective articulation (10a, 10b; 211a, 211b) to a hitching structure (13), which hitching structure (13) is in turn connected to said carrying vehicle (3).

13. The agricultural machine as claimed in claim 12, characterized in that said carrying vehicle (3) comprises a rear hitching device (14) intended to move

said hitching structure (13) in a substantially vertical direction.

14. The agricultural machine as claimed in any one of claims 1 to 13, characterized in that it comprises two front work units (4a, 4b).

15. The agricultural machine as claimed in any one of claims 1 to 14, characterized in that it comprises two lateral work units (5a, 5b).

16. The agricultural machine as claimed in any one of claims 1 to 15, characterized in that said carrying vehicle (3; 103) comprises a control device intended to autonomously manage the movement of said work units (4a, 4b, 5a, 5b) upon passing from said transport position to said work position, and vice versa.

17. The agricultural machine as claimed in any one of claims 1 to 16, characterized in that each work unit (4a, 4b, 5a, 5b) comprises a respective cutting device intended to cut a standing product, and in that at least one of said work units (4a, 4b, 5a, 5b) comprises a respective conveying device (25a, 25b, 26a, 26b; 326a, 326b) intended to move the product cut by the corresponding cutting device before said cut product touches the ground.

18. The agricultural machine as claimed in claim 17, characterized in that at least one of said front work units (4a, 4b) comprises a respective conveying device (25a, 25b).

19. The agricultural machine as claimed in claim 18, characterized in that said conveying device (25a, 25b) comprises a conveyor belt (29a, 29b) arranged transversely behind said corresponding cutting device.

20. The agricultural machine as claimed in claim 19, characterized in that there is provided a motor intended to drive said conveyor belt (29a, 29b) in two directions of travel.

21. The agricultural machine as claimed in any one of claims 18 to 20, characterized in that said conveying device (25a, 25b) is connected in a sliding manner to said corresponding front work unit (4a, 4b), and in that there are provided operating members intended to translationally move said conveying device (25a, 25b) horizontally, viewed in the work position, and transversely to said direction of forward travel (2).

22. The agricultural machine as claimed in any one of claims 17 to 21, characterized in that at least one of said lateral work units (5a, 5b) comprises a respective conveying device (26a, 26b; 326a, 326b).

23. The agricultural machine as claimed in claim 22, characterized in that said conveying device (26a, 26b; 326a, 326b) comprises an upper conveyor belt (30a, 30b; 330a, 330b) and a lower conveyor belt (31a, 31b; 331a, 331b), said conveyor belts (30a, 31a; 30b, 31b; 330a, 331a; 330b, 331b) being arranged, at least in one position, one above the other and transversely behind the corresponding cutting device.

24. The agricultural machine as claimed in claim 23, characterized in that said lower conveyor belt (31a, 31b) is connected in a sliding manner to said corresponding lateral work unit (5a, 5b), and in that there are provided operating members intended to translationally move said lower conveyor belt (31a, 31b) horizontally, viewed in the work position, and transversely to said direction of forward travel (2).

25. The agricultural machine as claimed in claim 23, characterized in that said lower conveyor belt (331a, 331b) is connected in a pivoting manner to said corresponding lateral work unit (5a, 5b) by means of an articulation (37a, 37b) whose axis is directed upward.

26. The agricultural machine as claimed in claim 25, characterized in that said lower conveyor belt (331a, 331b) comprises a first conveyor belt (35a, 35b) and a second conveyor belt (36a, 36b).

27. The agricultural machine as claimed in claim 26, characterized in that said second conveyor belt (36a, 36b) is connected in a pivoting manner to said corresponding first conveyor belt (35a, 35b) by means of a respective articulation (38a, 38b) of substantially horizontal axis.

28. The agricultural machine as claimed in any one of claims 1 to 27, characterized in that said carrying vehicle (3; 103) comprises two rear wheels (15b), said rear wheels (15b) being connected in a sliding manner to said carrying vehicle (103) by means of a respective articulation whose axis is substantially horizontal and transverse to said direction of forward travel (2), and in that there are provided operating members intended to translationally move each rear wheel (15b) in accordance with said respective articulation.

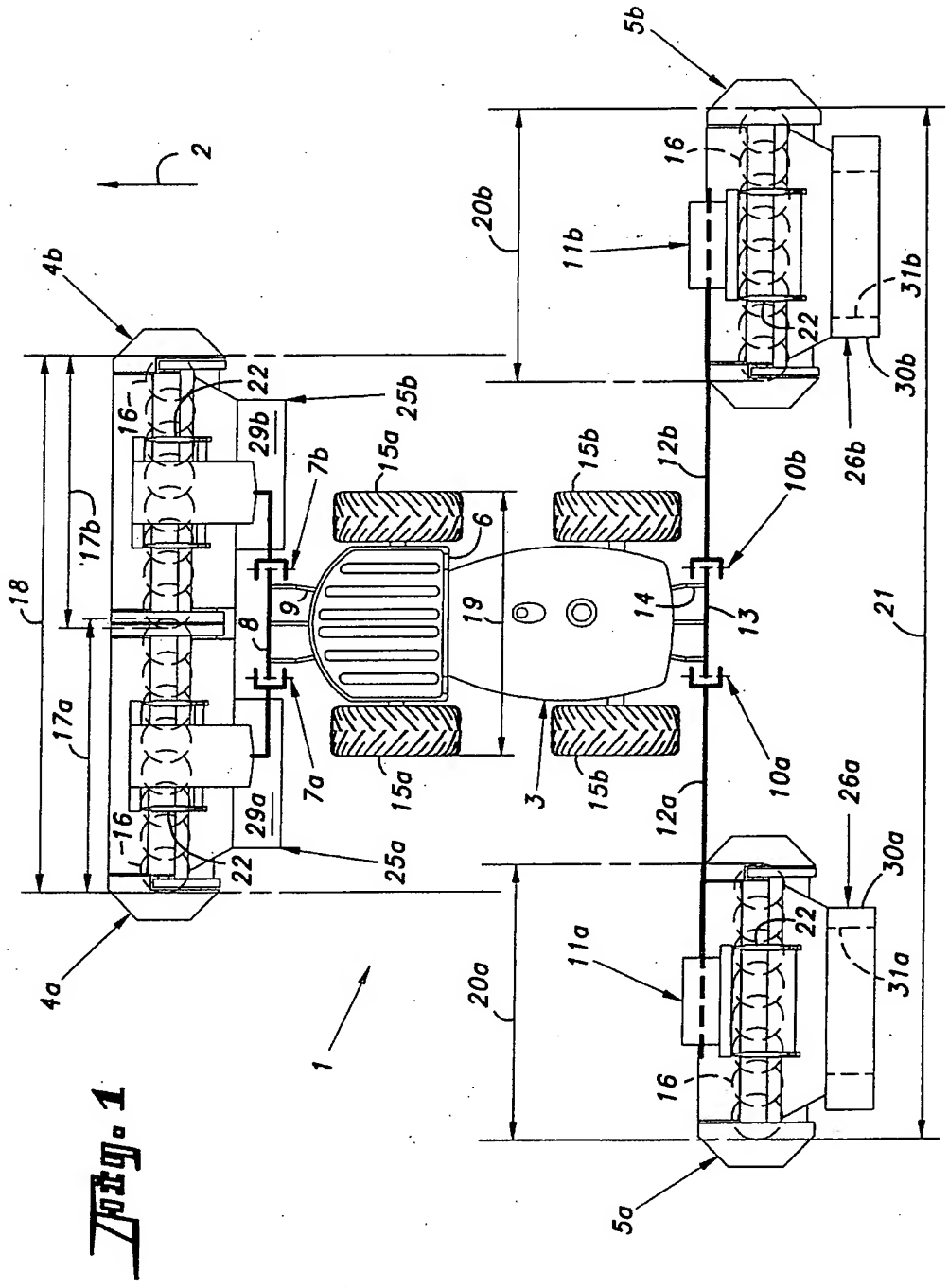
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Fig. 1

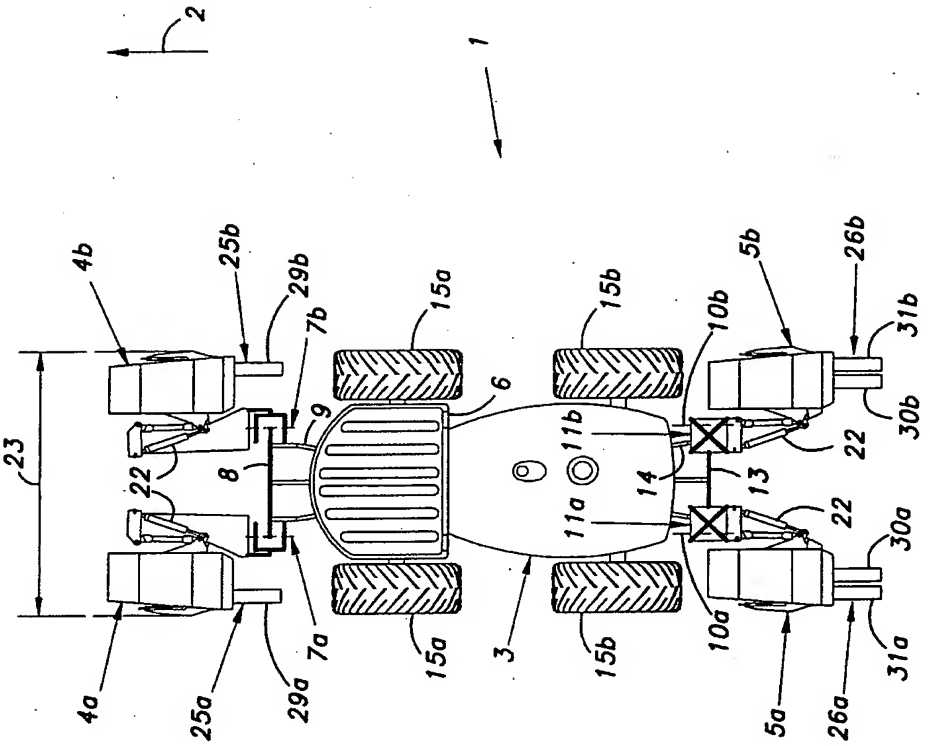
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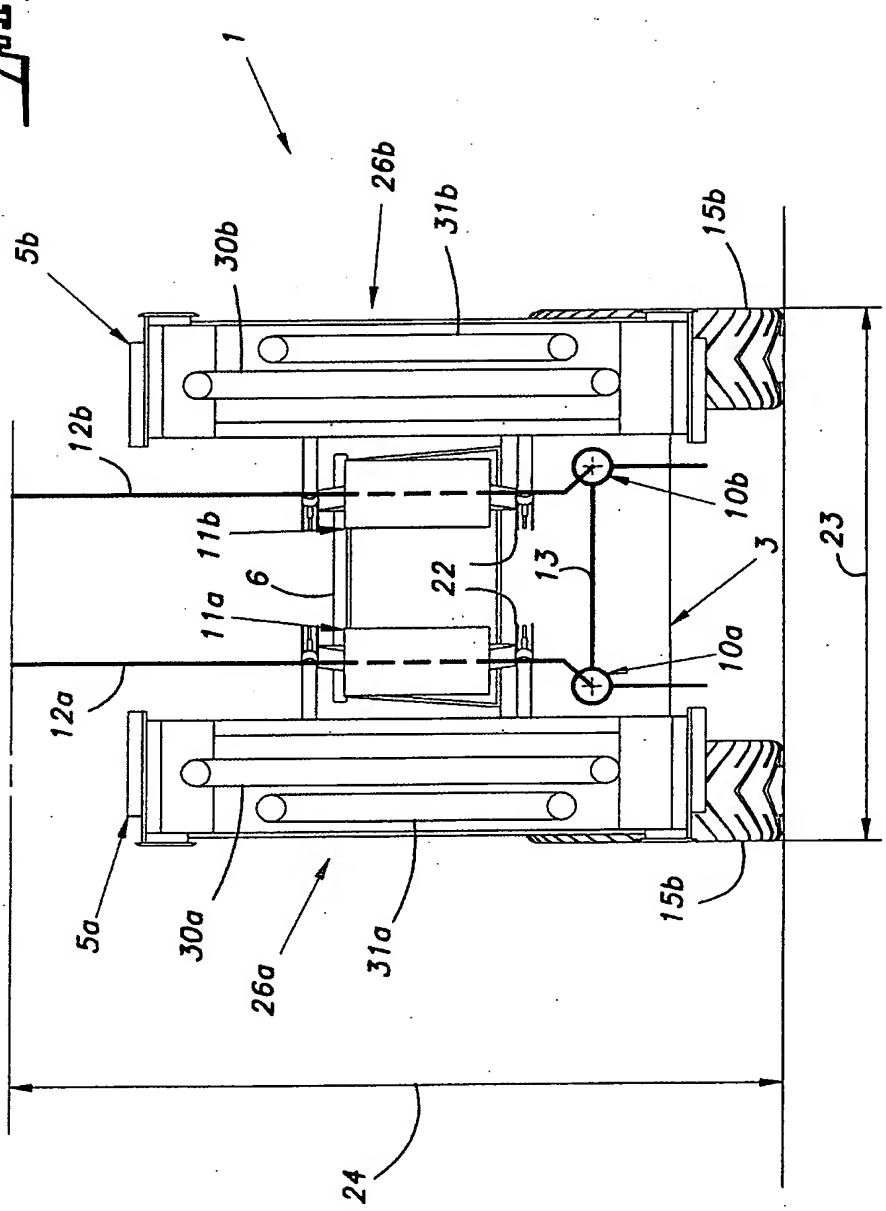
Fig. 2

Fig. 3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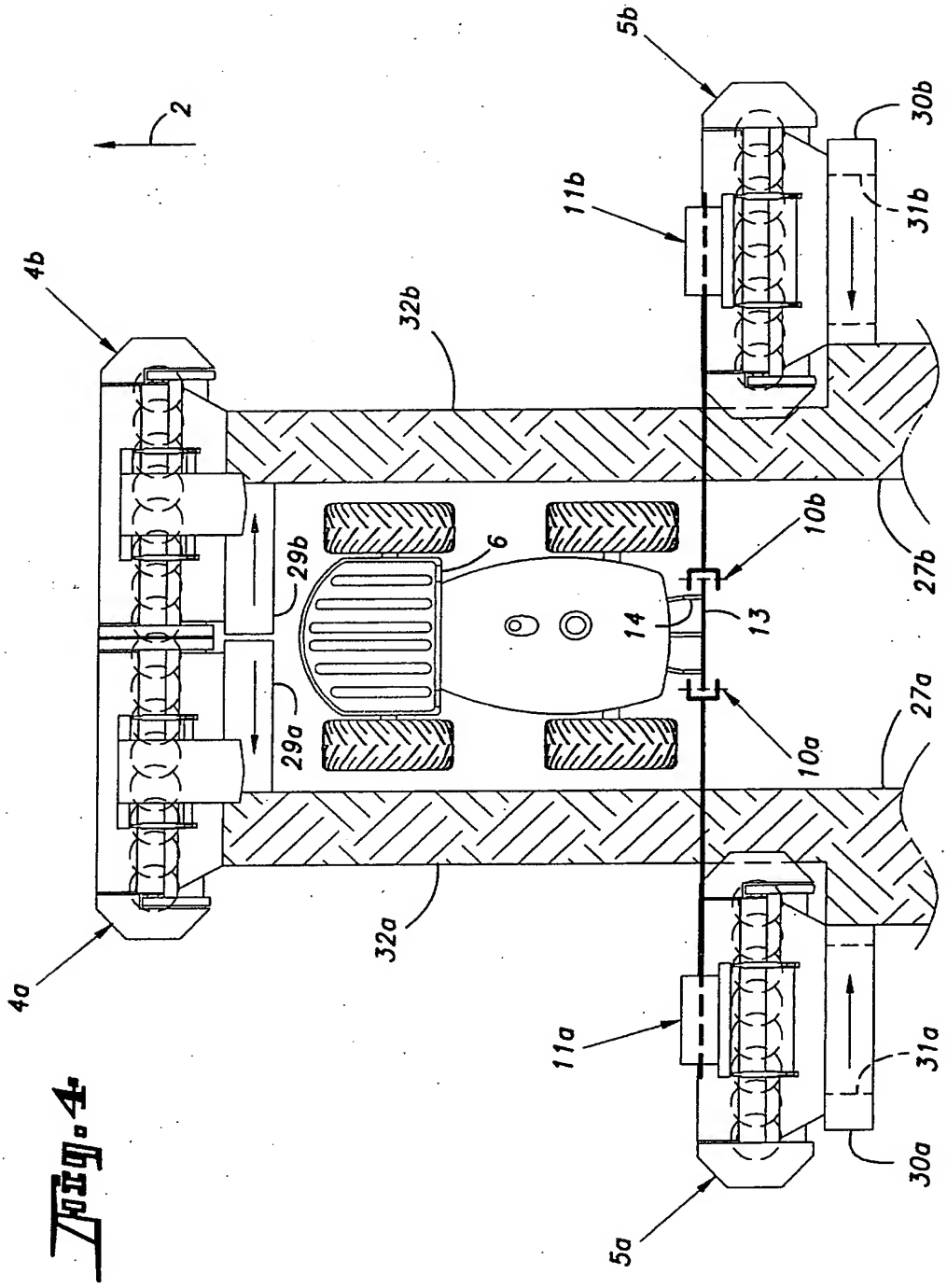
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Fig. 4

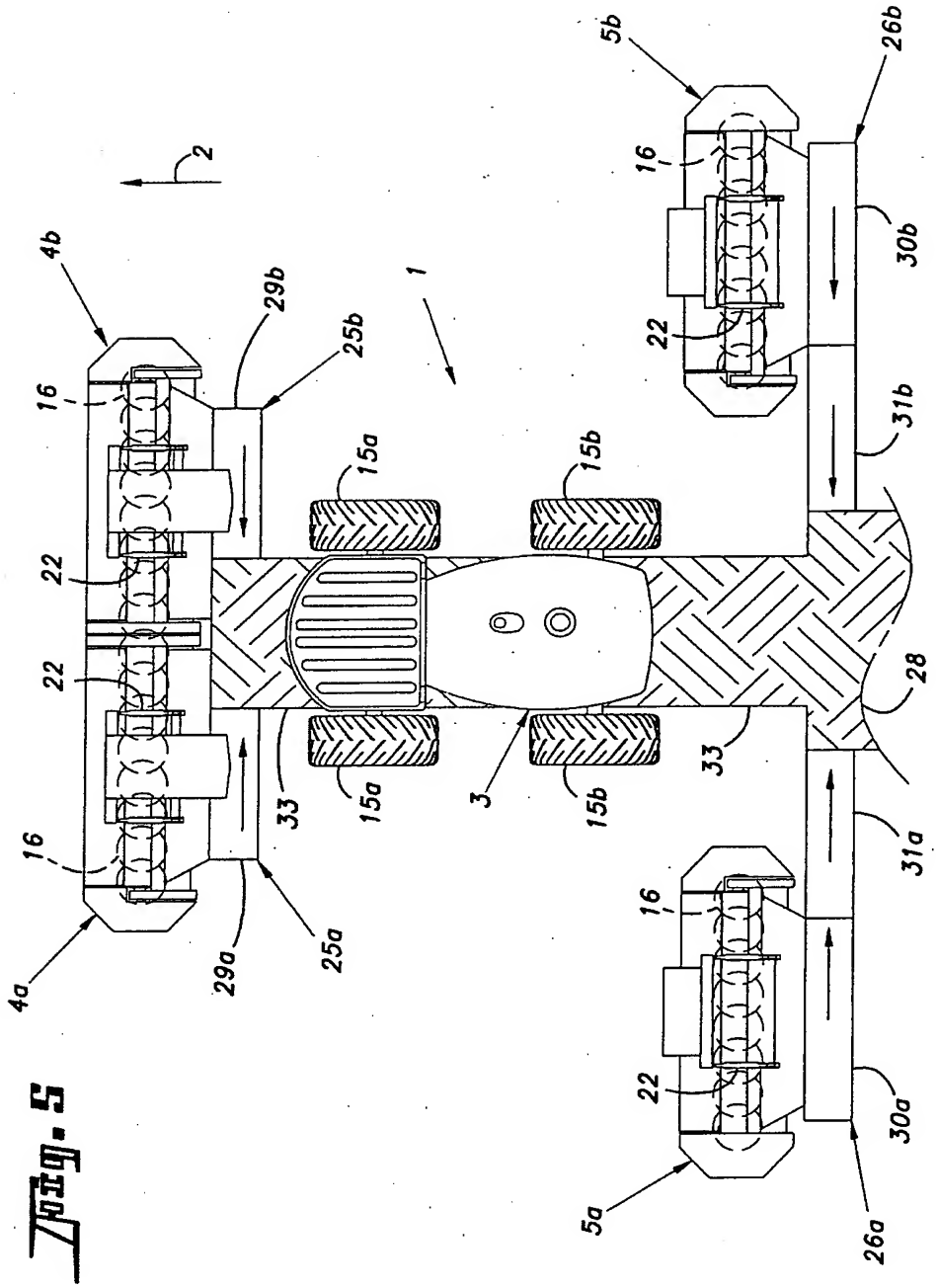
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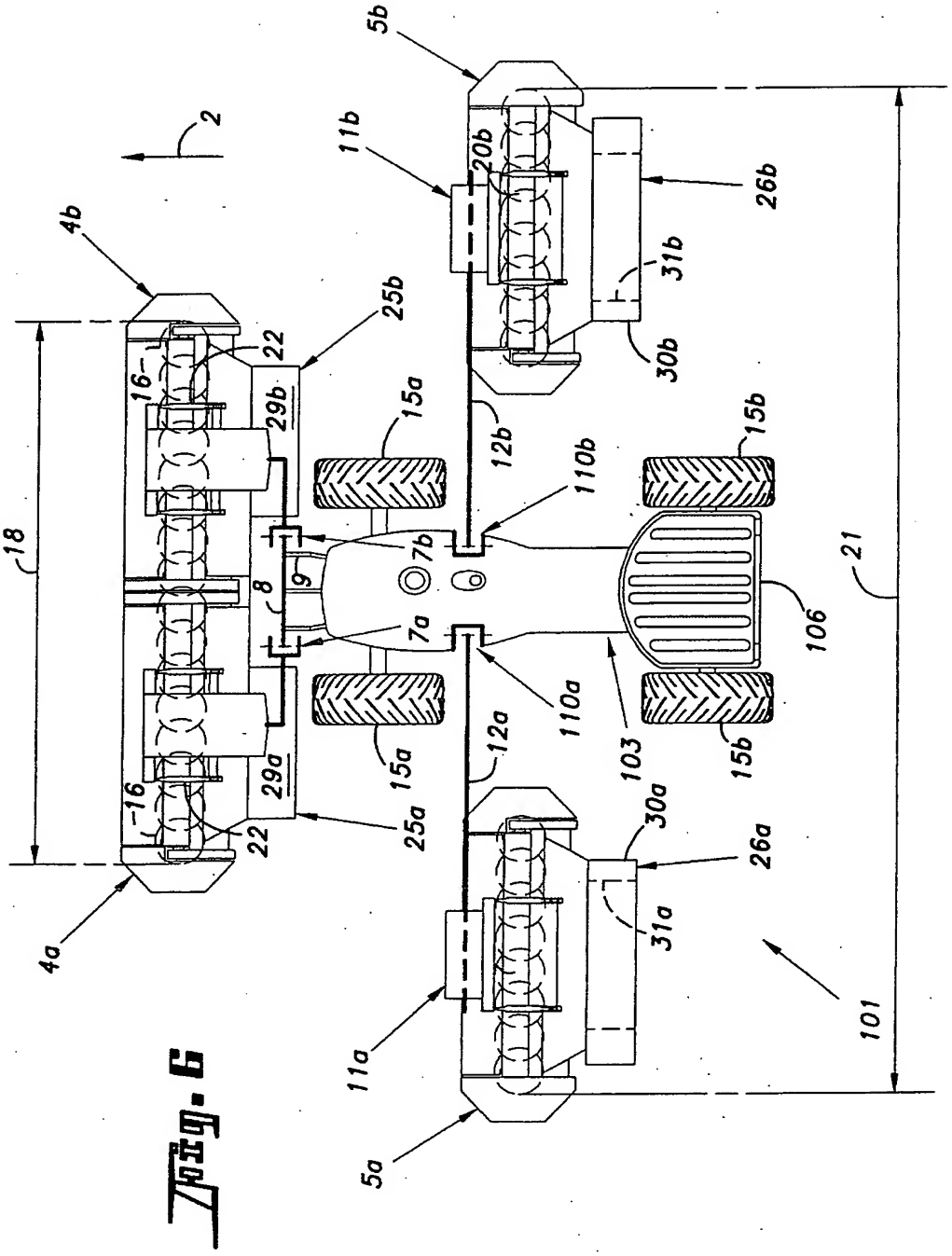
Fig. 5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8
9
7a
106
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Fig. 6

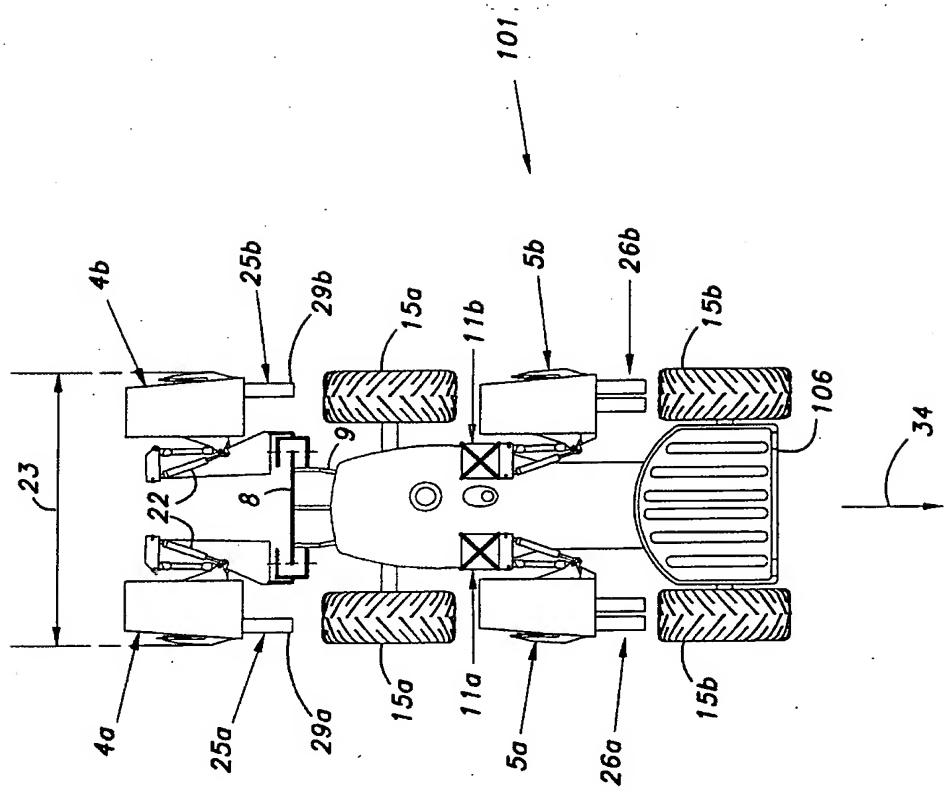
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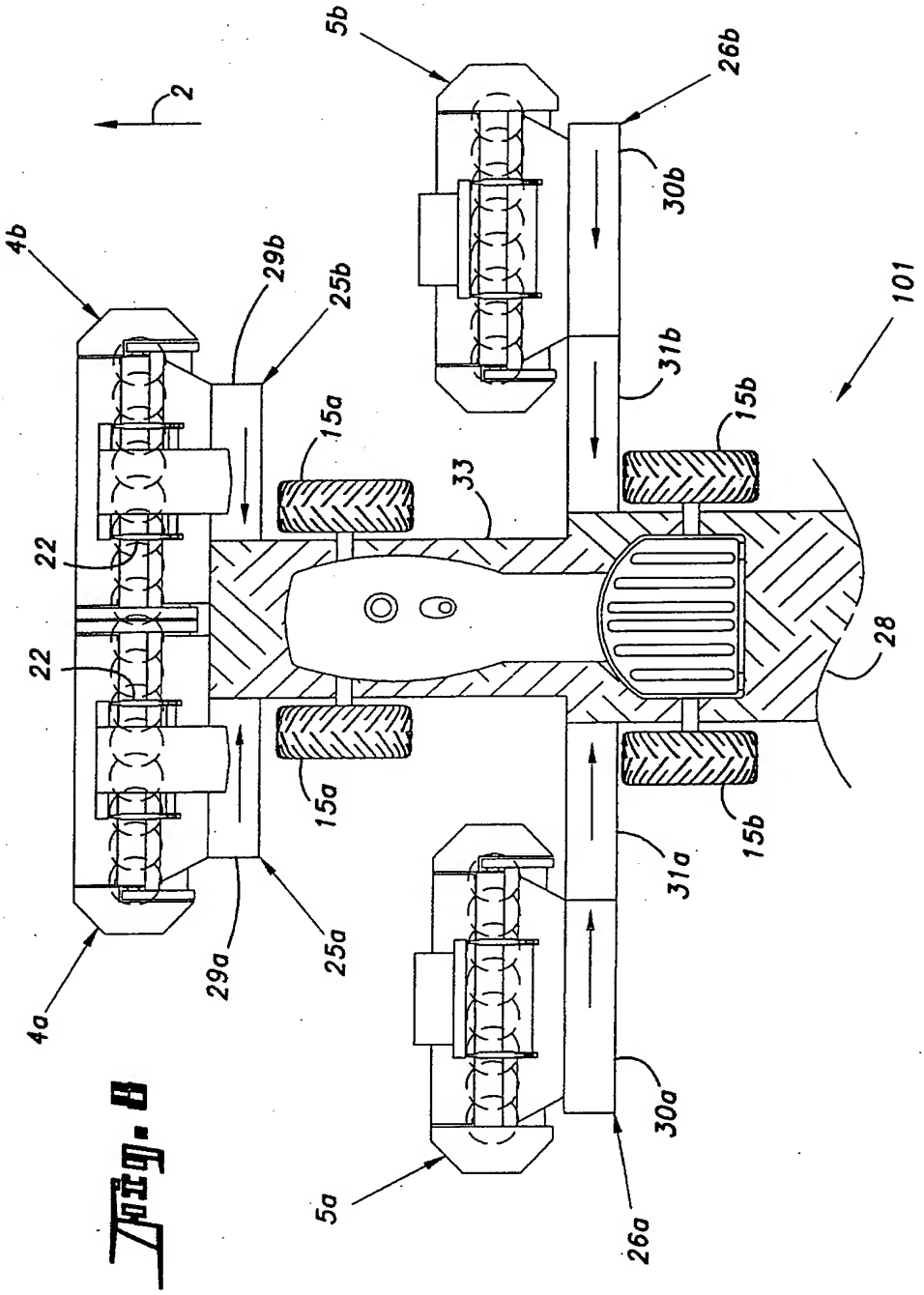
Fig. 7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26a

Fig. 8

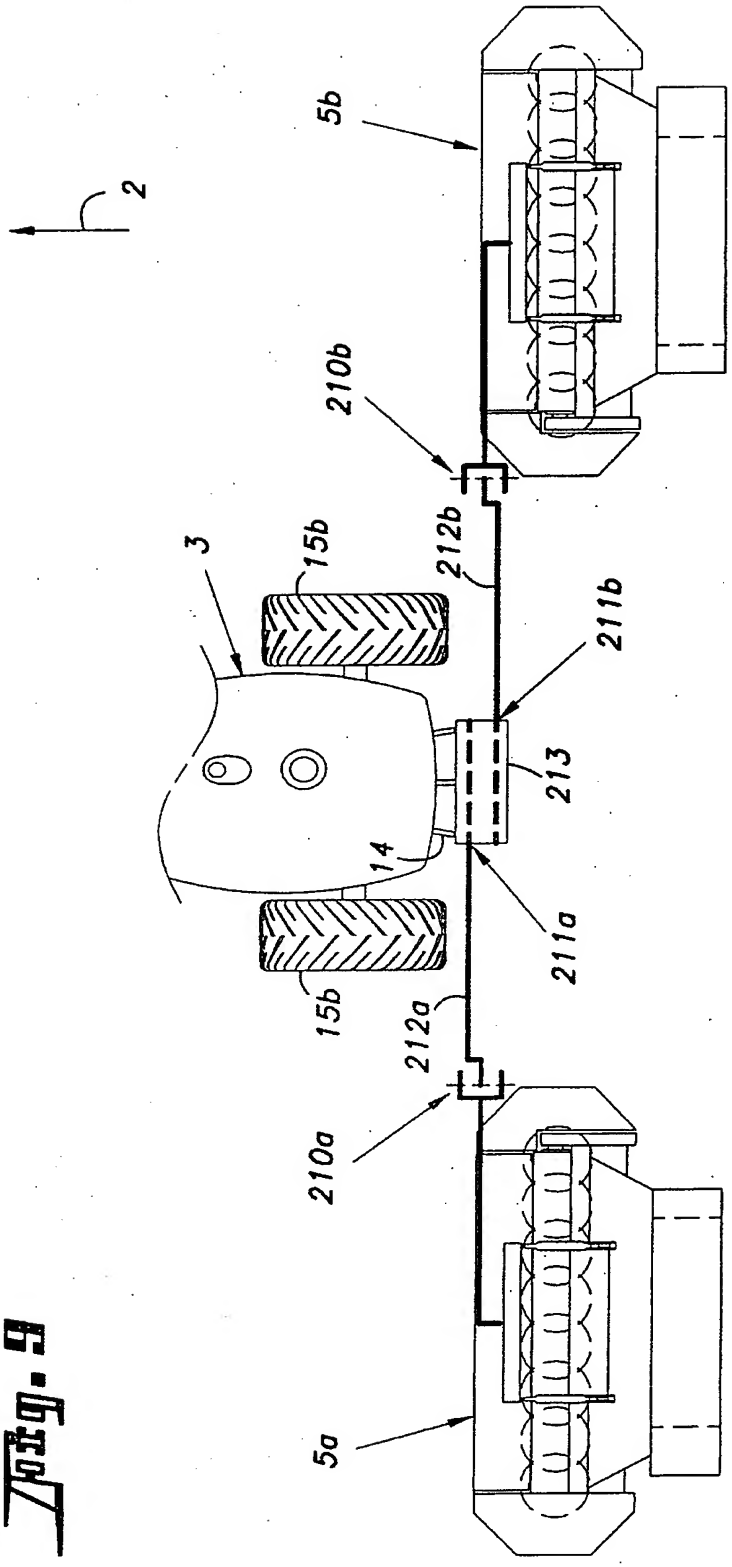
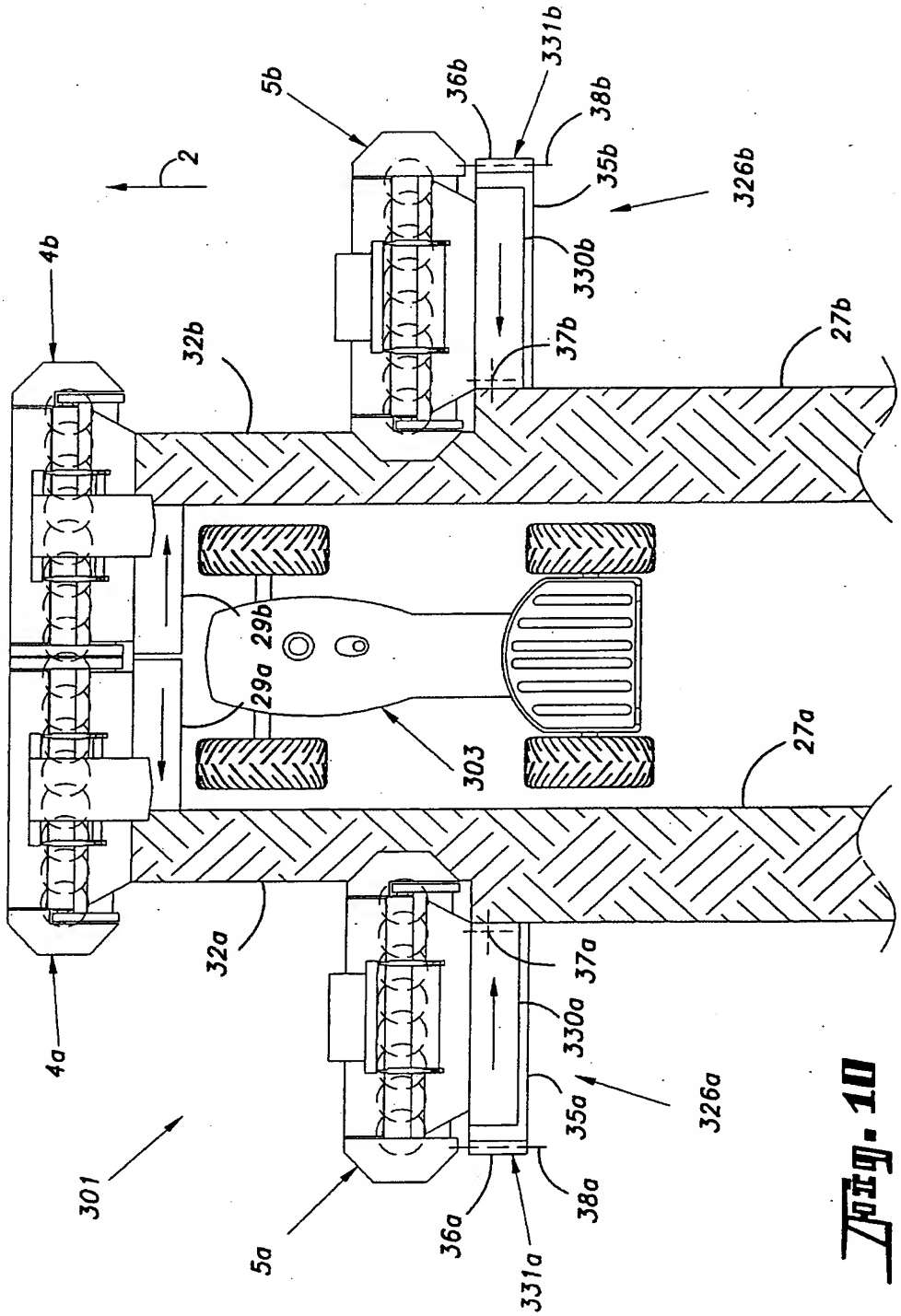


Fig. 9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301
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Фиг. 10

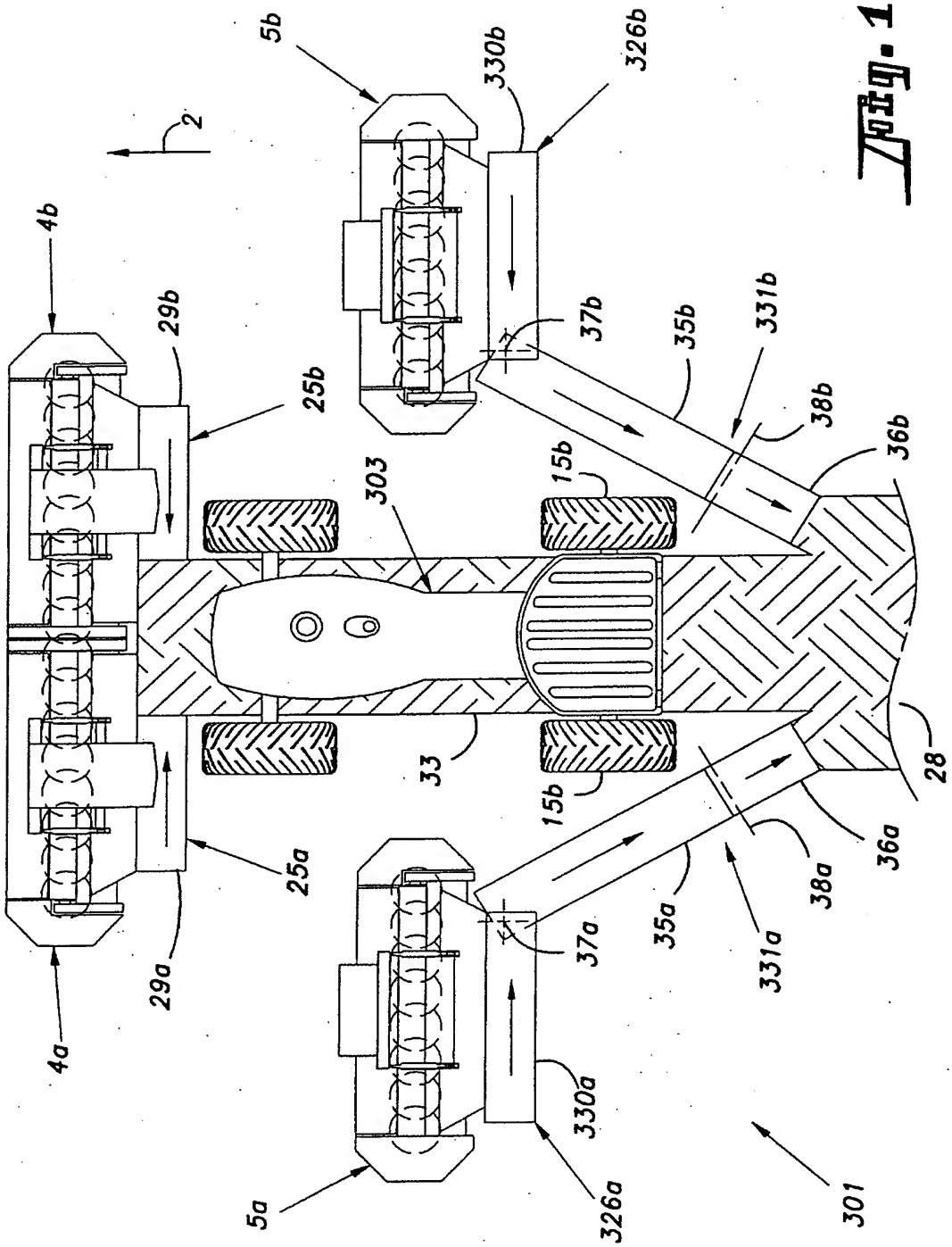
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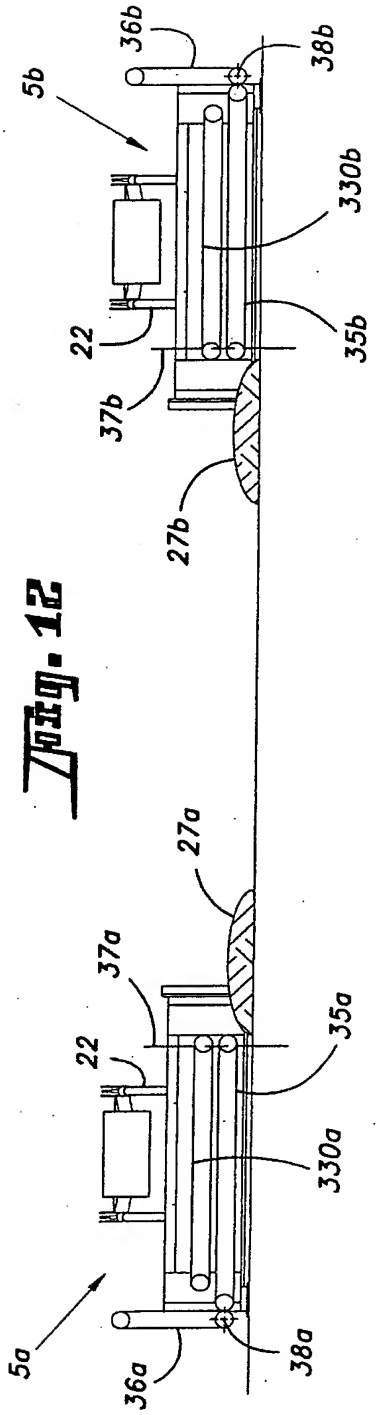
Fig. 11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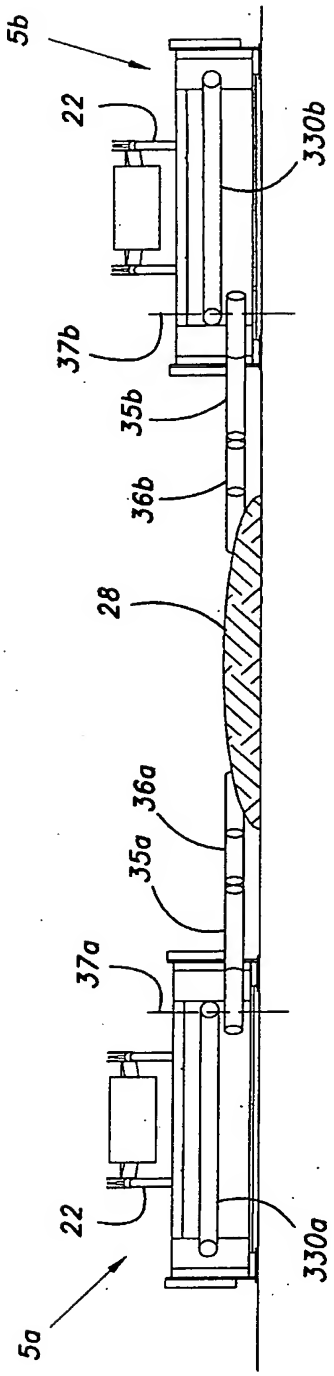
38a

Фиг. 12


5b
22
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36a
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5a

Фиг. 13

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INSTITUT NATIONAL DE LA PROPRIETE INDUSTRIELLE

PATENT

UTILITY CERTIFICATE

Intellectual Property Code - Book VI

cerfa
N° 11235*02

PATENTS DEPARTMENT
26 bis, rue de Saint Pétersbourg
75800 Paris Cedex 08
Telephone: 01 53 04 53 04 Fax: 01 42 93 59 30

DESIGNATION OF THE INVENTOR(S) Page No. . 1 . / . 2
(if the applicant is not the inventor or the sole inventor)

This form is to be filled in legibly in black ink

DB 113 W / 260899

Your file references *(optional)*	408 FR
NATIONAL REGISTRATION NO.	02/03,893

TITLE OF THE INVENTION (200 characters or spaces maximum)

AGRICULTUAL MOWER COMPRISING A CARRYING VEHICLE AND A NUMBER OF WORK UNITS

THE APPLICANT(S):

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DATE AND SIGNATURE(S) OF THE APPLICANT(S) OR OF THE REPRESENTATIVE (Name and capacity of the signatory)	*Saverne, 21 March 2002* *BONNIN DAVID* *REPRESENTATIVE* [signature]

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DESIGNATE(S) AS INVENTOR(S): (Indicate top right "Page 1/1". If there are more than 3 inventors, use an identical form and number each page, indicating the total number of pages.)

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	Postcode and town		
Employer company *(optional)*			
Name			
Forenames			
Address	Street		
	Postcode and town		
Employer company *(optional)*			
DATE AND SIGNATURE(S) OF THE APPLICANT(S) OR OF THE REPRESENTATIVE (Name and capacity of the signatory)		*Saverne, 21 March 2002* *BONNIN DAVID* *REPRESENTATIVE* [signature]	